Working Meeting to Address HIPPI-6400 Issues Only
Wednesday and Thursday, November 6-7, 1996
Phoenix, Arizona

1. Opening remarks and introductions

The Chairman, Don Tolmie of Los Alamos National Laboratory, opened this HIPPI-6400 meeting and thanked Chris Olson and Lockheed Martin for hosting this meeting. This group is constituted as both the HIPPI special working group (SWG) under X3T11, and the HIPPI Networking Forum (HNF) - Technical Committee (TC).

Don then lead a round of introductions. The list of attendees is at the end of these minutes.

2. Review / modify the draft agenda

The draft agendas were available on the web prior to the meeting. Hard copies were available at the meeting. No changes were requested. James Hoffman of Los Alamos volunteered to take the meeting minutes.

3. Review minutes of previous meetings

3.1 October 7-8, 1996, St. Petersburg Beach, FL

The St. Petersburg minutes were reviewed and approved with the addition of Don Tolmie's action item to split the document.

3.2 Review action items from St. Petersburg meeting

1. Greg Chesson to provide ARP text for inclusion in HIPPI-6400-SC and specify affects on bridging. (Carryover - add Fred Templin)
2. Hansel Collins to check the 0.6 ns (20-80%) rise and fall time values. (Done)
3. Michael McGowen to begin VC Message size restrictions discussion via email. (Cancelled)
4. Greg Chesson to review counter size of SuMAC Retransmission_Error counter and the need for both contiguous retransmission and total retransmission error counters. (Carryover)
5. Dave Parry to review the changed values for stall timeout and credit timeout. (Done)
6. Michael McGowen to look at bridging and address self discovery concerns with the new MAC Header and start a discussion on email for any unresolved issues. (Carryover)
7. Greg Chesson to have the SGI team review Figure 17. (Done)
8. Hansel Collins to modify the electrical values to what would be seen at the bulkhead. (Cancelled)
9. Henry Brandt to investigate grounding schemes for copper interface. (Done)
10. Greg Chesson to register the Ethertypes with INA / Xerox. (Carryover)
11. James Hoffman to update the Scheduled Transfer discussion Annex C with decisions from the meeting. (Done, integrated into ST)
12. Roger Ronald to update the Admin micropacket draft. (Done)
13. Don Tolmie to split the HIPPI-6400 document into a physical and Scheduled Transfer documents. (Done)
14. Don Tolmie to update HIPPI-6400-PH Rev 0.6 with the changes agreed to at the St. Petersburg meeting. (Done)

4. Review HIPPI-6400-PH changes since last meeting (reference HIPPI-6400-PH Rev 0.71)

The HIPPI-6400 changes were reviewed from cover to cover though are presented here in distinct categories.

4.1 Minor changes first and then return to unresolved issues in 4.7

In the Abstract, Foreword, Introduction, and Scope, changed from "small Messages" to "small transfers", "building Block" to "component", and "large Messages" to "large transfers" – accepted.

Removed the last line from the Abstract which read "Services are provided for transporting data associated with other HIPPI protocols.". This same change was made in the Foreword, Introduction, and Scope – accepted.

In the Introduction and Scope, removed the bullet items referring to Scheduled Transfers – accepted.

In the Introduction, changed the 5th bullet from "...and a building block for large Messages." to "...and a component for large transfers." – accepted.

Removed normative reference to X3.183, HIPPI-PH, since it was not referenced in the document – accepted.

In 4.1, changed "...16 (or fewer) bits wide for a fiber implementation." to "...eight bits wide for a fiber implementation." – accepted.

In 4.3, changed "...a micropacket is transmitted every 40 ns." to "...a micropacket is transmitted every 40 ns, with Null micropackets transmitted when other micropackets are not available." – accepted.

In 4.10, added the parenthetical phrase "(e.g., by the size of the TSEQ, RSEQ, and CR parameters)" to explain what about the protocol limited the maximum distance. Added the last sentence about a wide optical interface being described in an annex – accepted.

In 6.3, the group felt a need to express handling credit consumption for micropackets that are not stored in a VC buffer. Wally St. John to present words to reflector describing lack of credit consumption for link level micropackets.

In 6.3.2, changed "...shall be gap-fillers, used to keep the link active..." to "...are gap-fillers, and shall be used to keep the link active..." – accepted.

In 6.3.3, the description of Data micropackets was revised.

In Table 2, changed the TSEQ entries for Reset/Initialize and Null from "1*" to "x'FF'" – accepted.

In 6.5, added last sentence reading "The Source Credit Counter range shall be 255, and the number of outstanding credits shall be ≤ 255." – accepted.

In 6.5, changed Note 3 from "It is suggested that the VC with the least buffer space available be given priority to send Credit updates." to "If the Destination does not send adequate credits then the Source may not be able to send on every VC." – accepted.

In 12.1, Credit overflow was moved from a Link Shutdown cause to a Link Reset condition. The condition needs to be added to the document (possibly section 8.1).

In 12.3, 4th bullet, changed the Link Reset or Initialize timeout from 10 seconds to 2 seconds. In the last paragraph changed from "...administrative action is required..." to "...administrative action may be required...". Added a new paragraph describing the Hold-off timer. Added the Hold-off timer to table 7 – accepted.

Dave Parry noted that the Link Initialize timer of 2 s and Initialize Hold-off timer of 5 s give a system diameter of 2.5 which is too small. The group looked into changing the Initialize timer to .5 s and the Hold-off timer to 10 s. Wally St. John took an action item to present the selected Hold-off and Reset/Initialize timer values to Dave Parry.

In 14.1, the 100 ppm clock requirement was changed back to 200 ppm and section A.2 updated to reflect the change.

4.2 Items removed from HIPPI-PH and moved into HIPPI-ST

Deleted definitions for Block, HIPPI-PH, Scheduled Transfer, Transfer, and Virtual Connection. Deleted HIPPI-PH reference in the "HIPPI port" definition – accepted.

Deleted clause "4.5 Scheduled Transfers". Renumbered following subclauses to fill in the gap – accepted.

In 6.2, deleted the phrase "and may be used for Scheduled Transfers" in three places. Changed "plus two micropackets for Message headers (64 bytes)." to "plus a 32-byte Header micropacket." in 3 places – accepted with some rewording of the micropacket sizes. Roger Ronald took an action item to email the reflector with rewording on VC3 sizing restrictions.

Deleted 7.3, the rest of clause 7, and all of original clause 8, i.e., everything defining the Scheduled Transfer. Renumbered the clauses, figures, tables, and annexes to fill in the gaps (these changes were not marked with margin bars in the document text) – accepted.

Deleted Annex A describing mapping to other HIPPI protocols, and renumbered Annex B as Annex A – accepted.

Deleted Annex C – accepted.

4.3 CRC specification and parallel equations (pages 12-13, 31-36)

In 6.1, swapped the fields for TSEQ and RSEQ. Moved Tail to bit 06, Error to bit 07, TYPE to bits 02-05. Changed both the text and figure 7. The changes

were made to provide detection of the 4 4-bit cases missed by the CRC's – accepted.

In 6.6.2, deleted "and figure 3" from the sentence "Refer to tables 3 and 4, and figure 3, for the transmission sequence." – accepted.

In 6.6.2.1, replace two "it's" with what they were referring to – accepted. The group asked to remove the note as it doesn't add any useful information.

In 6.6.3, deleted "and figure 3" from the sentence "Refer to tables 3 and 4, and figure 3, for the transmission sequence." – accepted.

In A.4 - d, added that no registers are clocked in this step – accepted.

In figure A.4 moved the upper boxes apart so that the input lines coming from the bottom are shown more clearly – accepted.

Added A.5 giving the results of the CRC simulations – accepted.

4.4 Error processing (pages 15-18, 26)

In 8.2, added references to 8.4 for retransmission – accepted.

In 8.4, added the word "Micropacket" in the title. Added the first paragraph requiring 2 training sequences before a retransmission – accepted.

In 9.1.2, reworded the text and added a test for TSEQ – x'FF' and TYPE < x'8' – accepted.

In 9.1.4, added that "intermediate" Destinations shall treat unspecified TYPEs as Data micropackets, and left it open for Final Destinations. Added the note giving an explanation for the Undefined TYPEs treatment – accepted with a global change of "unspecified" to "undefined".

4.5 Copper interface specifications (pages 27-29)

In 15.2, changed the low level output from 0 V to 0.08 V – changed back to 0 V.

In 15.3, changed the differential voltage from 50 mV to 150 mV – accepted.

In 15.4, changed "table 10" to "figure 17", and ≤ 10 A to ≥ 5 A – accepted.

Changed the "Signal path" figure from figure 19 to figure 16 – accepted.

In 15.4, added "all appropriate compliance tests." to the EMI/RFI paragraph. Changed the test for the near end crosstalk – accepted.

In 15.5, added metric equivalents for the inch dimensions, and changed from "CL-2/FT4" to "CL-2.2/FT6" – accepted with the note the plenum rated jacket material is called "CL-2.2P".

Changed the title for the connector layout to "Bulkhead connector pin assignments". Changed it from a table to a figure. Changed the Power and Ground signals to "Reserved" – accepted.

The group requested to change the bulkhead figure to match the last proposal on the reflector. When SGI finishes the SuMAC pinout and Berg finishes the connector to cable layout the figure will be updated.

4.6 Message Structure (pages 14-16)

In the first paragraph of 7, changed "...will be padded..." to "...shall be padded..." – accepted.

In 7, second paragraph, replaced the sentence referring to the Schedule Header with the sentence reading "The last eight bytes of the Header may be used by other protocols, and are not defined in this standard." – accepted and exchanged places between the last two sentences of the first paragraph.

In Figure 10, removed the 2nd micropacket and labeled the last 8 bytes of the Header micropacket as "Opaque payload". Deleted the "(on all Messages)" entries. Changed the figure title from "Message headers" to "Header micropacket contents" – accepted.

In the last item of 7.1, changed "...in bytes, of the data bytes following..." to "...in bytes, following..." – accepted.

In 7.2, changed "Scheduled Transfer" to "Scheduled Transfer as specified in xxx" – accepted.

In 7.2, changed "...codings of the EtherType field shall be:" to "...codings of the EtherType field shall be as assigned in the current "Assigned Numbers" RFC. For the convenience of the reader, HIPPI-6400-specific EtherTypes are listed below:" Added "(See annex A.)" to the HIPPI-FP reference. Added EtherTypes x'8182' and x'8183' as "Locally administered" and "Reserved" respectively –

accepted. Removed reference to IP and the words "Non-scheduled" before the HIPPI-FP reference.

Added new subclause 7.3 about opaque payloads – accepted with the global change of "opaque payload" to "payload" to reduce confusion.

4.7 Resume discussions on items deferred in 4.1

All further discussions were integrated above.

5. Review HIPPI-ST (reference HIPPI-ST Rev 0.05)

The group discussed the title of the document and accepted HIPPI-ST (Scheduled Transfers). Though ST is applicable to other networks, HIPPI was kept in the name to keep the development within the X3T11 group.

5.1 Scheduled Transfers (pages 1-20)

Completely rewrote the Abstract, and the first paragraph of the Foreword, Introduction, and Scope – accepted with various politically-correct rewording. The word "transport" was avoided as being a red flag.

Changed "...end node" to "...end device" for consistency with other places in the document – accepted.

Replaced the bullet items in the Introduction and Scope – accepted with multiple bullet removals and changes.

Added a normative reference to HIPPI-6400-PH. Deleted the normative references for HIPPI-6400-SC, IEEE 802, and ISO / IEC 8802-2 – accepted.

Changed "...procedure..." to "...mode..." in the definitions for Concatenate and Persistent – accepted.

Added definitions for "operation" and "slot" – accepted.

Reworded many of the definitions for consistency and changed the replaced occurences of the word Message with STU (Scheduled Transfer Unit).

Added a new clause 4. The text contains some gems from the original document, and lots of new text. This is all very new stuff, so review it carefully, but don't expect perfection. An attempt was made to collect all of the nits that were hidden in the different operations into a more central location, e.g., the fact that buffer sizes must be ≥ 32 and a power of 2. – accepted with a lot of revising.

In figure 1, changed the headings from "In Device..." to "In end device..." – changed to "Device".

Made the Schedule Header figure stand alone without the MAC header. Renumbered the fields so that they started with byte 00 – not reviewed. The group decided that each Scheduled Header must have 8 bytes of payload and control operations may optionally have up to 32 more bytes of payload.

In 6.2 added that support of Concatenate and Persistent were optional, and an end device indicated if it supported it or not during the Virtual Connection setup – accepted.

In 6.2 changed the bits from selecting HIPPI-6400 VC's to selecting Data Channels. Included something for Data Channel 0 – accepted. Added an Interrupt flag and changed the description of the Notify flag to decrease confusion between the two.

In the individual operations in clauses 7 and 8, all of the parameters are now listed, and the field that it is carried in, if it is in a field with a different name. In an operation's Semantics, the field that carries the parameter is enclosed in brackets. In the text, the parameter used is called out first, and the field carrying it second – accepted.

In 7.1 and 7.2 added the indication of support for Concatenate and Persistent – accepted.

In 8.1 added that you can only request Concatenate and Persistent if support had been indicated during the Virtual Connection setup – accepted.

In 7.5, added the Port_Teardown_Complete operation to make it a three-way handshake – accepted. Don Tolmie took an action item to review crossing-in-the-night Port_Teardown and End operation cases and review the solution with Wally St. John.

In clauses 7 and 8 reassigned the op values in a linear fashion to accommodate the new operations – accepted.

In 8.6, allowed a DATA_ACK_Requested flag on other than the last Message of a Block – accepted with the note that DATA_ACK_Requested may only be processed if a Notify or Interrupt bit is also present.

In 8.6 said that the DATA_ACK should come after processing the Block – changed to after processing the STU.

In 8.6, 8.7 and 8.8 added Sync and C-limit parameters used to find out how many empty slots are available in the Final Destination for more operations – accepted. A long debate raged about updating state on both sides. The Request_ACK operation became State_Request and can be sent by either side. During a transfer, the State_Response (formerly DATA_ACK) will echo the requested Block number in the State_Request if the Block was successfully received (or -1) in B_num and the highest contiguous Block value from 0 in Offset. A State_Request outside of a transfer will send a D_id of -1 and the corresponding State_Response will only echo the Sync and return a C-limit.

It was noted that "slots" are only filled by control operations, and data operations that have the notify or interrupt bit set.

In 8.7 added the Request_ACK operation – accepted with a name change to State_Request.

In 8.7 added that a DATA_ACK should be sent immediately upon receipt of the Request_ACK – accepted.

The request for a STU to be optionally shortened by an Originating Source buffer boundary was removed as it causes too much extra work on the Destination end to perform read-modify-write operations (final destination pages should be completely filled excluding Block and Transfer boundaries). This option will be removed from the text.

Updated tables 1 and 2 to reflect the other changes – accepted.

In clause 9, listed the operations that expect a response, and specified a timeout to re-send the operation if the response is not received – not reviewed.

Added clause 10 (text from James Hoffman) on error processing – not reviewed.

5.2 Mapping 6400 ST to lower layers (Annex A, B)

Added Annex A and B – not reviewed.

5.3 Annex C on Scheduled Transfers (pages 23-27)

The text for Annex C was updated by James Hoffman from the Annex C in HIPPI-6400-PH. A summary table for Scheduled Transfer example was added – not reviewed.

6. HIPPI-6400-SC

6.1 Review recent document changes (Reference Rev .50)

Routing based on ULA's (instead of 12-bit logical addresses) was changed throughout the document – accepted with a few word changes.

Document formatting was suggested to conform with ANSI standards (such as bullets and lists format).

Noted that the definition of a "switch" includes the capability to assign ULA's.

Some of the definitions in PH and SC need to be worked out and duplicated between the documents.

The reserved logical addresses which only occupy 12 bits were noted to exist in a 48-bit address space and hence for the "reserved" addressing mode for legacy HIPPI networks, the group needs to acquire a 12-bit grouping of ULA's. Greg Chesson took an action item to have Art Beckman look into getting a 12-bit group of ULA's for HNF.

6.2 Admin micropackets (Reference Rev 0.4)

Added a definition for "device" and "Element" – accepted with the note to capitalize "Element" throughout the document.

The word "type" was changed to "function" to decrease confusion with other uses of type – accepted.

Admin command names will be changed so each word is separated by an underscore and so that "ACK" appears at the end of the name for consistence with HIPPI-6400-ST.

The description of Hop Count needs to be reworded and better explained as to when the Admin command is processed and when the Hop Count is decremented. The example should also conform to the definition.

Set_Element_Address and Set_Element_Address_ACK now provide a means to reset the Key value and to retrieve the Key value if lost. The Key only prevents inadvertent commands from improper functionality – accepted.

An indeterminant Hop Count should use x'FF' instead of x'0' – accepted.

The group asked for added "shalls" throughout the draft.

The Reset command was noted to completely reset the SuMAC chip and the group asked for a little more text about the level of reset involved.

7. HIPPI-6400 Copper

Ron Nikel presented data detailing the SGI 20 dB filter for reducing jitter. The results showed excellent eye-patterns for 150 ohm cable at 47 meters even when the link was run up to a gigahertz. The presentation also covered shorter cables and 110 ohm cables. For a copy of the presentation, contact Ron Nikel of SGI (ren@sgi.com).

Gene Dornhuff presented his results on the Gore quad-ax cable using the last Widmer worst case pattern and the initial SGI filter. The test showed degredation at the Source when the DC blocking capacitor created a filter with a pole above 1.6 megahertz. The SGI filtered tests were noted as incomplete as the filter was not designed specifically for the quad-ax cable characteristics.

Hansel Collins presented electrical values at the SuMAC for comparison with current document values. The group noted that pair-to-pair values are finalized, but the within-pair values need some work. An input termination network was also shown with parallel termination. Hansel Collins took an action item to find safe operation range for Input High Voltage and Input Low Voltage.

The group noted that the copper specifications are close to finished, but need to be finalized soon. There was some question as to where various specifications should be placed (receiver, transmitter, cable, etc.) Henry Brandt took an action item to collect values for completion of copper interface specifications.

To help finish connector specifications, Berg was given three action items:

John Ellis to review suggested connector layout.

John Ellis to determine retention force of connector.

John Ellis to redo values for near end crosstalk.

The group also wants to specify the connector in the document, but without giving away Berg's exact implementation. A basic picture will be shown in the document with a Berg reference part to obtain exact drawings from Berg and to ease part ordering.

8. Future meeting schedule

8.1 December 2-3, 1996, Minneapolis, MN

During the X3T11 December plenary week , the following HIPPI meetings are scheduled:

Monday, December 2 -
9 AM - 9 PM — HIPPI-6400

Tuesday, December 3 -
8 AM - 9 AM — HNF Plenary
9 AM - 11 AM — HIPPI-TC General and -6400
11 AM - 9 PM — HIPPI-6400 Optical (with connector presentations)

The location is the Embassy Suites, 79301 34th Avenue South, Bloomington, MN. Horst Truestedt and IBM are the host. (See the meeting announcement on the web page at http://www.cic-5.lanl.gov/~det/ for further details.)

8.2 January 7-9, 1996, Phoenix, AZ

During the January interim week , the following HIPPI meetings are scheduled. **Note that an extra day has been added.**

Tuesday, January 7 -
1 PM - 9 PM — HIPPI-6400

Wednesday, January 8 -
8 AM - 9 PM — HIPPI-6400 Copper
Thursday, January 9 -
8 AM - 6 PM — HIPPI-6400

The location is Phoenix, AZ. Chris Olson and Lockheed are the host. (See the meeting announcement on the web page at http://www.cic-5.lanl.gov/~det/ for further details.)

8.3 Future meeting dates and locations

The following 1997 X3T11 plenary week dates are firm (except for December which may be shifted one week later to avoid the Thanksgiving holiday).

Recent changes to this list are underlined to make them easier to find.

1997 –

Feb 3-4	Plenary	San Jose, CA	Sun
Mar 5-6	Interim	San Jose, CA	Berg
Apr 7-8	Plenary	Palm Springs, CA	Brocade
Apr 30, May 1	Interim	Mt. View, CA	SGI
Jun 9-10	Plenary	Seattle, WA	Boeing
July 9-10	Interim	Minneapolis, MN	Cray
Aug 4-5	Plenary	Honolulu, HI	Hitachi
Oct 6-7	Plenary	Tucson, AZ	FSI
Dec 1-2	Plenary	Orlando, FL	DPT

The 1998 schedule is less firm, but here is what is currently being considered by X3T11 for the plenary meetings. Question marks note the ones that are still in question. Hopefully HIPPI-6400 will be far enough along that we will not need interim working meetings.

1998 –

Feb 9-10	Plenary	San Diego	Qlogic
Apr 20-21	Plenary	Palm Springs, CA	Brocade
Jun 8-9	Plenary	St. Petersburg Beach, FL	AMP
Aug 10-11	Plenary	??	??
Oct 5-6	Plenary	Tucson, AZ (?)	FSI (?)
Dec 7-8	Plenary	Ft. Lauderdale, FL	Adaptec

9. Review action items

All of the following action items apply to HIPPI-6400.

1. Greg Chesson and Fred Templin to provide ARP text for inclusion in HIPPI-6400-SC, and specify effects on bridging.
2. Greg Chesson to review counter size of SuMAC Retransmission_Error counter and the need for both contiguous retransmission and total retransmission error counters.
3. Michael McGowen to look at bridging and address self discovery concerns with the new MAC Header and start a discussion on email for any unresolved issues.
4. Hansel Collins to investigate ways of specifying interoperability voltages by detailing components, parasitics, and parameters at the driving and receiving ends.
5. Greg Chesson to register the Ethertypes with INA / Xerox.
6. Roger Ronald to email the reflector with rewording on VC3 sizing restrictions.
7. Wally St. John to present words to reflector describing lack of credit consumption for link level micropackets.
8. Wally St. John to present the selected Hold-off and Reset / Initialize timer values to Dave Parry.
9. Greg Chesson to have Art Beckman look into getting a 12-bit group of ULA's for HNF.
10. Greg Chesson to present text to reflector to describe RTR setup using the Persistent bit.
11. Don Tolmie to review crossing-in-the-night Port_Teardown and End operation cases and review the solution with Wally St. John.
12. Hansel Collins to find safe operation range for Input High Voltage and Input Low Voltage.
13. Henry Brandt to collect values for completion of copper interface specifications.
14. John Ellis to review suggested connector layout.
15. John Ellis to determine retention force of connector.
16. John Ellis to redo values for near end crosstalk.
17. Roger Ronald to update HIPPI-6400-SC Rev 0.5 with changes agreed to at the Phoenix meeting and incorporate the Admin micropacket draft Rev 0.4.
18. Don Tolmie to update HIPPI-6400-ST Rev 0.05 with the changes agreed to at the Phoenix meeting.
19. Don Tolmie to update HIPPI-6400-PH Rev 0.71 with the changes agreed to at the Phoenix meeting.

10. Adjournment

The group adjourned at 5 pm.

11. Attendance

John Ellis	Berg
Austin Washington	Berg
Barbara Weber	Berg
Michael Karg	Cable Design Technologies
Bob Willard	Digital Equipment Corp
Bob Pearson	Essential Communications
Herb Van Deusen	Gore
Randy Hardy	Harris
Henry Brandt	IBM
Chris Olson	Lockheed Martin
Gene Dornhuff	Los Alamos National Lab
James Hoffman	Los Alamos National Lab
Don Tolmie	Los Alamos National Lab
Fred Templin	NASA Ames
Joe Parker	Optivision
Craig Davidson	Raytheon E-Systems
Roger Ronald	Raytheon E-Systems
Greg Chesson	Silicon Graphics
Hansel Collins	Silicon Graphics
Ronald Nikel	Silicon Graphics
Wally St. John	Silicon Graphics